

Citation:

Mellen PB, Walsh TF, Herrington DM. Whole grain intake and cardiovascular disease: A meta-analysis. Nutr Metab Cardiovasc Dis. 2008 May;18(4):283-90.

PubMed ID: [17449231](#)

Study Design:

Meta-analysis

Class:

M - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To quantify the available observational evidence on whole grain intake and clinical cardiovascular events as well as to review the potential mechanisms of this association.

Inclusion Criteria:

The following criteria were used to select the manuscripts to use for the analysis

1. The studies were performed using self-reported quantitative measures of whole grain intake (e.g. servings/day)
2. Cardiovascular events were determined prospectively
3. The studies provided adequate data to generate adjusted event rates.

Exclusion Criteria:

- retrospective study
- use of qualitative whole grain measures
- data subsequently updated

Description of Study Protocol:**Recruitment**

Studies were identified from a medline search conducted from 1996 to 2006 with the search words “cardiovascular” and “whole grains”. In addition relevant references were drawn from the citations of the selected manuscripts.

Data was extracted by independent investigators, and inconsistencies were resolved by mutual agreement

by the investigators

Design: Meta-analysis

Statistical Analysis

- Studies that met entry criteria and provided sufficient data were included in the analyses, with study weights based on the inverse variance.
- For the main and secondary analyses the Mantel-Haentzel test for heterogeneity.
- Since there was no evidence of significant heterogeneity ($Q = 0.04-8.17$, $p = 0.07-0.83$), fixed-effects models were used.
- Publication bias was evaluated using funnel plots and the Egger test
- Sensitivity analyses corrected for bias using the trim-and fill method
- All analyses were performed using MIX v. 1.2

Data Collection Summary:

Analysis:

- For within-study comparisons, individuals in the highest quantile of whole grain intake were compared to individuals with the lowest whole grain intake.
- Covariate adjusted event rates were derived from published event rates and adjusted relative risk estimates.
- For studies that reported risk estimates for multiple cardiovascular endpoints, the most comprehensive
- Cardiovascular disease endpoint was utilized for the primary analysis and multiple models were also evaluated including adjustments for demographics as well as fully adjusted models that included cardiovascular risk factors separately.
- Secondary analyses evaluated specific endpoints (coronary heart disease (CHD)/CHD mortality, ischemic stroke/stroke mortality) and subgroups (men, women) based on risk-factor adjusted estimates.
- The relationship between refined grain intake and cardiovascular events was assessed using studies that provided this information.

Dependent Variables

- cardiovascular endpoints- coronary heart disease, ischemic stroke

Independent Variables

- whole grain intake

Control Variables

gender and demographics (age, race, education, smoking, co-morbid conditions, physical activity)

Description of Actual Data Sample:

Total number identified: not given

Number of studies excluded: 3

Number of studies included in analysis: 7 prospective cohort studies

6 provided information for demographic-adjusted analyses and 7 included information for risk-factor adjusted analyses.

Summary of Results:

Key Findings

- Seven prospective cohort studies with quantitative measures of dietary whole grains and clinical cardiovascular outcomes were identified
- Six studies provided information for demographic/adjusted analyses and seven included information for risk-factor-adjusted analyses
- The event estimates adjusted for cardiovascular risk factors, greater whole grain intake (pooled average 2.5 servings/d vs. 0.2 servings/d) was associated with a 21% lower risk of CVD events [OR 0.79 (95% CI: 0.73-0.85)].
- High intake of whole grains was associated with a 37% lower risk of incident cardiovascular disease in the analyses based on demographic-adjusted estimates [OR .63 (95% CI 0.58-0.68)]
- The association was still evident with an analyses based on risk-factor-adjusted estimates, [0.79 (0.73-0.85)]. Despite the evidence of publication bias, after being evaluated with the Egger test (intercept= -2.32, p = 0.001), the results were similar in analyses that corrected for this using the trim-and-fill method
- Similar estimates were noted for different CVD outcomes (heart disease, stroke, fatal CVD) and in sex-specific analyses. Conversely, refined grain intake was not associated with incident CVD events [1.07 (0.94-1.22)]

Author Conclusion:

Due to the evidence that dietary whole grains have been inversely associated with cardiovascular risk factors, atherosclerosis, and incident cardiovascular disease the authors recommended that stronger efforts are needed that incorporate clear messages on the beneficial effects of whole grains into public health and clinical practice policies.

Reviewer Comments:

The reviewer agrees with the authors conclusions. Further research is needed to clarify the beneficial effects of consuming whole grains and CVD and to develop a clear message for the public to understand on how and why they need to incorporate more whole grains into their diets.

Research Design and Implementation Criteria Checklist: Review Articles

Relevance Questions

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|----|---|-----|
| 1. | Will the answer if true, have a direct bearing on the health of patients? | Yes |
| 2. | Is the outcome or topic something that patients/clients/population groups would care about? | Yes |
| 3. | Is the problem addressed in the review one that is relevant to nutrition or dietetics practice? | Yes |

4.	Will the information, if true, require a change in practice?	Yes
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Validity Questions

1.	Was the question for the review clearly focused and appropriate?	Yes
2.	Was the search strategy used to locate relevant studies comprehensive? Were the databases searched and the search terms used described?	Yes
3.	Were explicit methods used to select studies to include in the review? Were inclusion/exclusion criteria specified and appropriate? Were selection methods unbiased?	Yes
4.	Was there an appraisal of the quality and validity of studies included in the review? Were appraisal methods specified, appropriate, and reproducible?	???
5.	Were specific treatments/interventions/exposures described? Were treatments similar enough to be combined?	Yes
6.	Was the outcome of interest clearly indicated? Were other potential harms and benefits considered?	Yes
7.	Were processes for data abstraction, synthesis, and analysis described? Were they applied consistently across studies and groups? Was there appropriate use of qualitative and/or quantitative synthesis? Was variation in findings among studies analyzed? Were heterogeneity issues considered? If data from studies were aggregated for meta-analysis, was the procedure described?	Yes
8.	Are the results clearly presented in narrative and/or quantitative terms? If summary statistics are used, are levels of significance and/or confidence intervals included?	Yes
9.	Are conclusions supported by results with biases and limitations taken into consideration? Are limitations of the review identified and discussed?	Yes
10.	Was bias due to the review's funding or sponsorship unlikely?	Yes

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